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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/912,589	07/24/2001	David P. Bour	M-8772 US	7208

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EXAMINER

LOUIE, WAI SING

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 10/07/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/912,589

Applicant(s)

BOUR ET AL.

Examiner

Wai-Sing Louie

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) 1-8 and 18-24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 9-17 and 25-31 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-8 and 18-24, drawn to a light-emitting device, classified in class 257, subclass 79.
- II. Claims 9-17 and 25-31, drawn to a method of manufacturing the light-emitting device, classified in class 438, subclass 22.

The inventions are distinct, each from the other because of the following reasons:

Inventions Group I and Group II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case, instead of forming an active region with a composition-graded quantum well, it would be possible to form an active region with a pseudomorphic lattice matched quantum well.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

During a telephone conversation with Norman Klivans on 8/6/02 a provisional election was made with traverse to prosecute the invention of Group II, claims 9-17 and 25-31.

Affirmation of this election must be made by applicant in replying to this Office action. Claims

1-8 and 18-24 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 9 recites the limitation "the substrate" in line 10. There is insufficient antecedent basis for this limitation in the claim. For the purpose of examination, "the first semiconductor layer" is assumed.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 9, 11, 13, 15-17, 25, 27, 29, and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by Schetzina (US 5,670,798).

With regard to claims 9, 25, and 31, Schetzina discloses semiconductor device containing Group III-V nitride compound material (col. 10, line 40 to col. 22, line 45 and fig. 3) comprising:

- Forming a first semiconductor layer 114b of a first conductivity type and having a first surface;
- Forming an active region 112 over the first semiconductor layer 114b, the active region 112 including a second semiconductor layer, the second semiconductor layer having a quantum well layer and a barrier layer or a plurality of quantum well layers (col. 9, lines 61-62), the second semiconductor layer formed from a III-nitride alloy having an indium mole fraction or composition graded (fig. 9c) in a direction substantially perpendicular to the first surface of the first semiconductor layer;
- Forming a third semiconductor layer 114a of a second conductivity type over the active region 112.

With regard to claim 11, Schetzina discloses the grading the composition of the III-nitride semiconductor alloy asymmetrically (fig. 9c).

With regard to claims 13 and 29, Schetzina discloses grading a mole fraction of the III-nitride semiconductor alloy linearly (col. 11, lines 17-20 and fig. 9a).

With regard to claims 15 and 27, Schetzina discloses grading the mole fraction of indium (fig. 9c).

With regard to claim 16, Schetzina discloses grading the mole fraction of aluminum (fig. 6a).

With regard to claim 17, Schetzina discloses the active region 112 is formed directly on the first semiconductor layer 114b (fig. 3).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 10 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schetzina (US 5,670,798) in view of Yano et al. (US 6,045,626).

With regard to claims 10 and 26, Schetzina does not disclose forming the second semiconductor layer in a wurtzite crystal structure. However, Yano et al. teach the crystal epitaxially grow on the surface of a hexagonal base substrate such as AlO_x substrate or a ZnO base thin film would form a wurtzite crystal structure (Yano col. 3, lines 17-40). Schetzina discloses a sapphire (AlO_x) substrate with a ZnO buffer layer 134 (fig. 3). Therefore the structure epitaxially grow on the ZnO would be wurtzite type.

Claims 12, 14, 28, and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schetzina (US 5,670,798).

With regard to claims 12 and 28, Schetzina discloses the wurtzite type compounds such as ZnO and GaN exhibit piezoelectricity (col. 4, lines 28-32), but does not disclose change the composition of indium in the group III-nitride semiconductor alloy would reduce the effect of a piezoelectric field in the active region. However, Claims double are rejected under 35 U.S.C. 103(a) as being unpatentable over Schetzina discloses grading the indium mole fraction of indium in the quantum well layer (fig. 9c). Therefore, it would have been obvious to reduce the piezoelectricity field as the present invention.

With regard to claims 14 and 30, Schetzina discloses III-nitride semiconductor alloy is $\text{Al}_y\text{Ga}_{1-y}\text{N}$ with $0 \leq y \leq 1$, and $y=1$ (col. 13, line 28), but does not disclose the semiconductor is $\text{In}_x\text{Al}_y\text{Ga}_{1-x-y}\text{N}$ with $0 \leq x \leq 1$, $0 \leq y \leq 1$, and $x+y \leq 1$. However, Schetzina discloses the present invention applies to ternary and quaternary III-nitride alloy including AlInGaN (col. 14, lines 49-54). Therefore, it would have been obvious Schetzina includes $\text{In}_x\text{Al}_y\text{Ga}_{1-x-y}\text{N}$.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wai-Sing Louie whose telephone number is (703) 305-0474. The examiner can normally be reached on 7:30 AM to 4:00 PM.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (703) 306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Art Unit: 2814

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

wsl

September 26, 2002


Oshk Chaudhuri
Supervisory Patent Examiner
Technology Center 2800